ATK3 I/O Module (Modbus Slave)

The ATK3 I/O Module by ElectroCom

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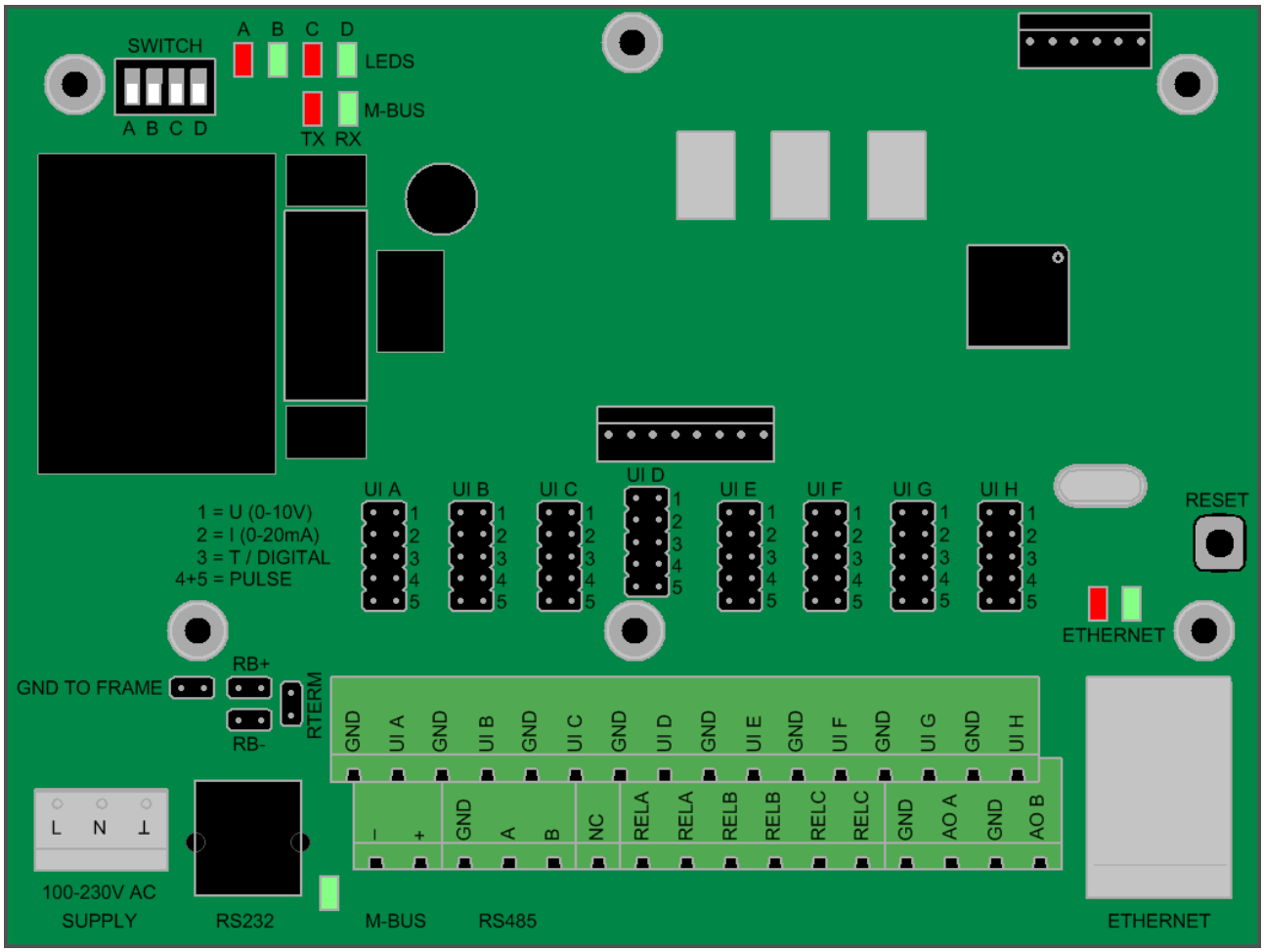
1 Hardware

The ATK3 I/O Module is based on the ATK3 hardware platform. It's features include:

- 8 Universal inputs
- 3 Relay and 2 analog outputs
- Serial interfaces for Mbus, RS232 and RS485
- Network interface (Ethernet, TCP/IP)
- M-Bus interface



Picture 1:ATK3 - Hardware Layout

1.1 Inputs

There are 8 universal inputs on the ATK3 (”UI A” … ”UI H”). Each of them can individually be set up to digital, pulse, voltage, current or NTC input.

The input type is set up on the ATK3 with up to 2 jumpers that can be placed in 5 different positions for each input (see Picture 1:ATK3 - Hardware Layout):

	Voltage 0 – 10.00V
	Current 4 – 20mA
	Digital and NTC
	Pulses

Tabel 1: Jumper Settings

1.2 Outputs

The ATK3 has five output channels in two different variations. Three relay output channels for efficient switching of loads and two scalable analog output channels.

1.2.1 Relay

There are 3 relay outputs on the ATK3 - *Relay A*, *Relay B* and *Relay C*. Nominal switching capacity (resistive load):

1.0A 30V DC
0.3A 30V AC

1.2.2 Analogue

There are 2 analogue outputs on the ATK3 – *AO A* and *AO B*. The analogue outputs can range from 0V to 17.50V DC.

1.3 RS485

For serial communication on a multiuser line the ATK3 plattform provides a 3-wired RS485 connection (+[A], -[B] and GND).

Three jumpers are used to set up the RS485. Two for R-BIAS (RB+, RB-), that may be set for a Modbus master only. Leave them unset for Modbus Slaves. The Last jumper R-TERM (term) is used to enable the termination resistor on the ATK3 plattform.

For RS485 wiring guidelines check the application note by Maxim:
http://www.maxim-ic.com/appnotes.cfm/an_pk/763/

1.4 Ethernet

For connections over TCP/IP the ATK3 provides a RJ45 Ethernet connector. By default the module is set to dynamic setup of the IP address by DHCP. In case the DHCP server is unavailable, the default configuration is a follows:

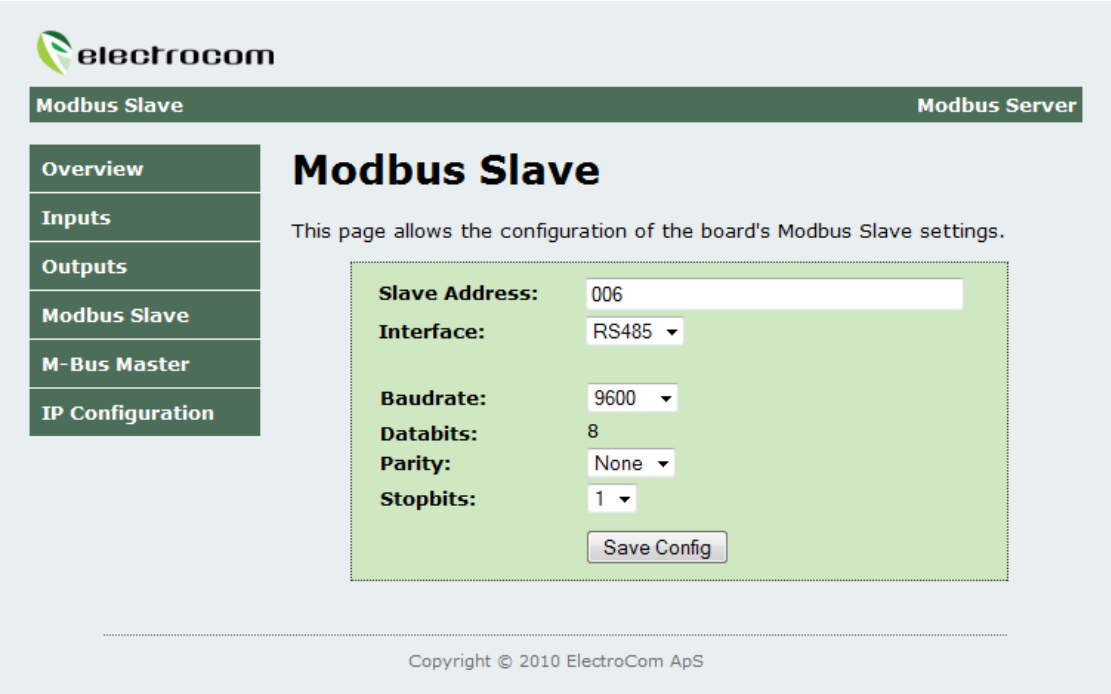
- **IP address:** 10.0.0.200
- **Subnet mask**: 255.255.255.0
- **Gateway**: 10.0.0.1
- **Primary DNS**: 194.239.134.83
- **Secondary DNS**: 193.162.153.164

2 I/O Module

Within the transaction based Modbus protocol, the I/O Module application takes the role of a Modbus Slave. It is listening to the interface and waits for Modbus requests issued by the Modbus Master (Client). The I/O Module generates a response and sends it back to the client module.

2.1 I/O Module Settings

The default Modbus slave address is set to the last 2 digits of its ethernet MAC address, so address conflicts when using multiple Modbus slaves can be avoided. For communication with the Modbus network, the serial interfaces RS232/RS485 as well as the network interface are available.



Picture 2:Configuration – Serial interface

2.1.1 I/O Module Serial Setting (RS232/RS485)

In serial mode, the I/O Module has the following parameters:

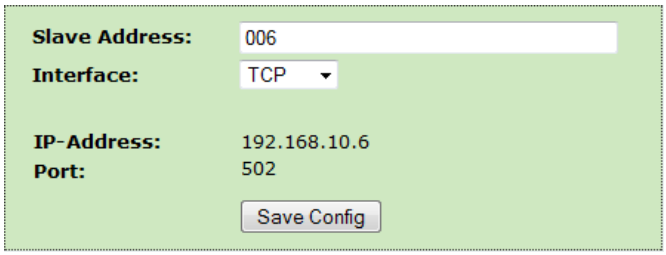
- Slave Address: 1 - 247
- Baudrate: 300, 600, 1200, 2400, 4800, 9600 or 19200
- Data bits: 8
- Parity: Even, Odd or None
- Stop bits: 1 or 2

The slave address for an I/O Module can range from 1 to 247 and determines the unique address of the module within the Modbus network. The module will only reply to requests that contain this specific address.

For both types of serial communication – RS485 and RS232 - telegrams are required to comply with the RTU package format. ASCII package format is *not* supported.

2.1.2 I/O Module Network Settings (Ethernet, TCP/IP)

When using the network interface for Modbus communication, the server will listen for requests on TCP port 502. Even though the unit address of a Modbus slave is configurable, the server will reply to every request received, as it is the only Modbus slave instance known under a specific IP address.



Picture 3:Configuration - Network interface

When using a global IP address, make sure router and firewall are set up correctly, so a TCP connection to port 502 can be established from the internet.

2.2 Error handling

The I/O Module has 4 LEDs that indicate the status of its application:

- **LED A**
  - Flashing – Modbus Slave is receiving data (serial only)
- **LED B**
  - Flashing – Modbus Slave is transmitting data (serial only)
- **LED D**
  - Constantly ON – Modbus Slave is OK
  - Flashing – Modbus Slave error

Possible reasons for error might be a mismatching checksum of a Modbus telegram received, bus error from different port parameters in use or incomplete sending and receiving of telegrams. Check the the configuration and cable connections.

Pressing the *"Save Config"* button within the configuration site will restart the interface unit with the new parameters. If the configuration is correct and the error persists, a reset of the module might solve the cause of error.

2.2.1 Factory Reset

To reset the module to factory settings, set *"Switch D"* to "On" while power is off. Power up the module and the factory settings will be loaded within 10 seconds. Set the *"Switch D"* back to "Off" once the factory settings are restored.

3 XNC I/O Module example

The following example will guide you through the configuration of the XNC I/O Module. The server will request the physical input values from up to 32 clients and - based on the value - set the output level of each client individually.

3.1 Configure the communication interface

Set up the XNC I/O Module within the Trend SET (System Engineering Tool) application. Within the configuration window you can choose between serial (RS232/Rs485) or the network interface for the Modbus communication.

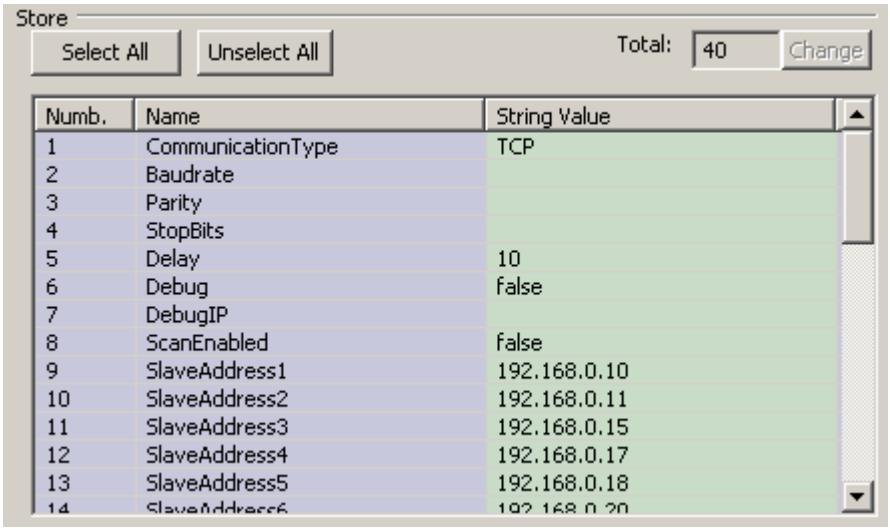
3.1.1 Configure the serial interface (RS232/RS485)

For serial communication set the **CommunicationType** to *"RS232"* or *"RS485"*. When using a static set of slaves, set **ScanEnabled** to *"false"* and fill out the fields for **SlaveAddress1** to 32 with numeric Modbus slave addresses from 1 – 247.

For Modbus networks, in which slaves might get installed or removed dynamically, set the **ScanEnabled** field to ”true”. The XNC I/O Module will eventually initiate a scan for slaves and add the results to a temporary list.

3.1.2 Configure the network interface (Ethernet, TCP)

Set the **CommunicationType** to ”*TCP*” and **ScanEnabled** to ”*false*”. Fill out the fields for **SlaveAddress1** to 32 with the IP addresses of up to 32 Modbus slaves. Make sure the XNC I/O Module is able to connect to all IP adresses on the list, as the Trend controller may need up to 2 minutes to establish a TCP connection.



Picture 4:XNC I/O Module - TCP Configuration